Sensible Agents: augmenting and empowering human decision-makers

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Abstract

The development of computer systems that interact with human operators requires an intelligent mechanism for defining their relationship(s). This research demonstrates a computer augmented cognition framework characterised as human-machine symbiosis. The responsibilities of the computing system are elevated from mere information sources to those of an entity that can form complex relationships with the appropriate humans. Specifically, the research addresses the augmentation of human decision-making providing software agents to augment the cognitive processing required to form decision-making organisations, plan within those organisations and conduct situation assessment to best perceive and respond to changing, complex environments.

Successful operation in the complex and uncertain environments were humans and computers interact require that these "agents" form complex relationships, plan for and achieve goals and understand their situational context. Sensible Agents are proposed as one platform for testing operational paradigms affecting human-machine symbiosis. The complex relationships that may be formed among agents and humans are formally modelled within Sensible Agents as agent autonomy. The Sensible Agent planning capabilities for these complex domains include domain modelling, intelligent replanning and metric planning using symbolic model-checking and linear programming. Situational assessment is implemented using symbolic and numerical belief revision algorithms. To support the testing of these capabilities, an experimentation test bed has been developed that supports distributed development, rapid prototyping and repeatable statistical evaluation of capabilities.

Introduction

Multi-agent systems provide an ideal method for modelling the human factor design issues related to augmented cognition modelling. Augmented cognition